



Expose Yourself: Dynamic Pricing and Demand Response for Federal Facilities

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OUTLINE



- Dynamic pricing defined
- Availability and advisability
- EX: Moorhead F.O.B., Pittsburgh, PA
- Demand response defined
- Overview of DR program types
- Key DR trends in U.S.
- Why federal participation has traditionally been low
- Positive signs for feds re DR
- Key take-aways



Dynamic Pricing



- Def.: Retail electric pricing that is responsive to changes in the wholesale markets, such as:
 - Real-time pricing
 - Day-ahead pricing
 - "Block-and-swing" pricing
 - "Critical peak" or "peak day" pricing
- Time-of-use is not considered a form of dynamic pricing b/c prices are fixed
 - i.e., they're not *directly* responsive to wholesale market gyrations



Is it even available to me?



- Maybe ...
 - 15 states and DC are "deregulated," i.e., they have true retail electric choice:
 - OR, TX, IL, MI, OH; whole northeast (MD to ME) except VT
- But there are dynamic pricing options in parts or all of many other states, e.g.:
 - WA, CA, AL, GA, NC, SC, MO, KS, OK
 - Most commonly, these are real-time/day-ahead or block-and-swing type tariffs
 - CA's large customer default is "peak day" (PG&E) and "critical peak" (SCE and SDG&E) pricing



And isn't it risky?



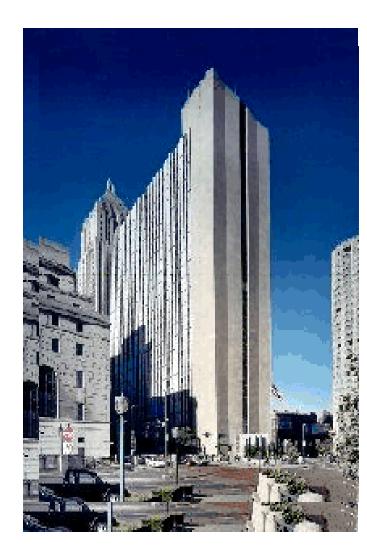
- YES, it is ... but is that risk bad?
 - Average savings over time, relative to locking in flat-priced power, is 5-10%
 - This translates to \$50-100K savings on a \$1M electric bill and that assumes no change of use
 - If you can respond some to prices, the downside risk is minimized and savings increase
- How much is budget certainty worth?
 - Especially given that fed. gov't. (and even most agencies)
 have a diversified portfolio of facilities
 - This diversification means oddities in one area will be cancelled out by others, so only overall market risk remains
- So why are fed. sites buying this insurance?



Case Study: GSA's Moorhead FOB



- 785,000 sq. ft., Pittsburgh, PA
- Cooling: two 600-ton Trane centrifugal chillers
- Load response capability: 39
 ice storage tanks with ~ 7,000
 ton-hours of thermal energy
 storage (TES) capability
 - Maximum discharge rate (we think): ~ 1,000 tons (~ 25 tons per tank)





Moorhead Before (till 2008)



- 3rd-party supply contract for flat-priced electricity
- Ice storage operated as back-up if chiller went down and as supplement to cooling plant on summer days
 - Note: cooling with ice storage requires ~ 25% more energy than standard chiller operation
- Local utility had rate rider for ice storage but it offered little value and Moorhead wasn't on it
 - only allowed higher nighttime peaks (b/c of TES operation) to be overridden by facilities' daytime peaks
- TES's value: was likely reducing PJM's peak capacity charges some, but that benefit probably canceled out by higher overall cost to operate



Moorhead After (since 2008)



- 3rd-party supply contract for electricity indexed to day-ahead
 PJM market
- Goal is to avoid PJM capacity charges (set by demand during five "peak load contribution" hours) and generally avoid high prices in PJM market
- Ice storage operated in one of three modes, depending on demand level in PJM territory (indicated by daily e-mail):
 - Green melt runs throughout business day
 - Silver melt runs 12-5, complemented by operation of one chiller, if needed
 - Gold melt runs 1:30-5:00 at max discharge rate; chiller use avoided entirely



Moorhead Results



- Savings: ~ \$235K over two years (> 14%) in savings relative to flat price option
- Energy Penalty?
 - Likely some, b/c air conditioning with ice is 25% more energy-intensive
 - Unadjusted comparisons showed about 5-10% year-overyear increases in electricity from summer, 2007 to summer, 2008
 - Confounding variable is additional space that came on-line over this period



Demand Response



- Def.: A short-term decrease in electrical consumption by end-use customers due to either increased electricity prices or incentive payments
 - Incentive payments could be triggered by high wholesale market prices or compromised grid reliability
- DR participation can be either through load curtailment (short-term conservation) or self-generation



Main DR program types



- Reliability-based: "emergency" and "capacity" programs
 - Most common: "interruptible/curtailable" rates
 - Oldest variety: sometimes called "active load management"
 - Also includes direct load control
 - Program calls usu. require mandatory response
- Price-based: "economic" programs
 - Participation usually voluntary
 - Day-of and day-ahead options common
 - Demand bidding programs



Key DR Trends



- DR resource participation in capacity auctions
 - Big opportunity in New England ISO and PJM
 - Attractive prices, usu. > \$40,000/MW
- Automated DR ("Auto-DR")
 - Load drop or self-generation routine triggered automatically by external signal (e.g., XML)
 - Signal can indicate market price threshold (e.g., 25¢/kWh) or that utility is instigating DR event
- FERC backing
 - In rulings, e.g., that DR resources should be paid full "location marginal price"
 - In pushing regional transmission operator (RTO) model where central body runs grid and wholesale market



Bottom Line



- DR is growing in the U.S. and will continue to because it's getting:
 - a) easier
 - b) more lucrative
- Also, building power plants is getting more and more difficult (and expensive)



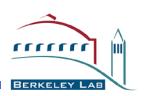
Federal participation has traditionally been poor – why?



- Classic "split incentive" problem
 - Who benefits when fed. facility saves \$ w/ DR?
 - And can fed. facility even take the proceeds?
- Lack of push in legislation or EOs
 - EE & RE goals are strong, but DR/LM not addressed
- Ignorance partly due to two issues above
 - "Our loads are flat so it doesn't make sense"
 - "It's too risky"
- Variable returns, esp. w/ economic programs
 - This hinders DR in guaranteed savings vehicles like ESPCs



However, things are looking up ...



- DLA-Energy's "Master Agreements"
 - Simplifies contracting with independent (non-utility)
 "curtailment service providers" (CSPs)
 - > 50 sites have signed up in less than three years
- Legislative help (though only for DoD, for now)
 - 2010 NDAA gave explicit okay to DoD facilities to contract with independent CSPs
- Other good signs
 - FERC is behind DR and ruling accordingly
 - FEMP's list of DR programs: www1.eere.energy.gov/ femp/financinging/energyincentiveprograms
 - Or navigate through "Project Funding" section of FEMP's site



Take-Aways



- Dynamic pricing's risk can be a good thing!
 - Risk has up side, too, esp. when you can hedge
 - And contracting for flat pricing (in dereg'd. states)
 is bad idea don't pay for insurance policy
- Numerous types of DR opportunities are available to federal customers
 - Ranging from voluntary to mandatory programs
- If you have any ability to respond, you should be taking advantage of one or the other
 - And there are resources to help you, esp. FEMP and DLA